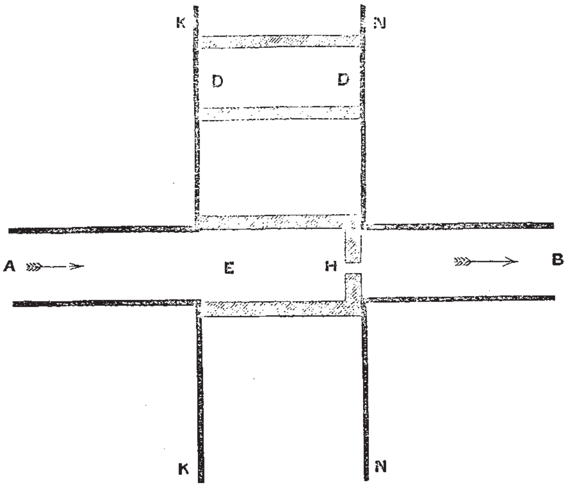
Company, he employed compressed air to drive carriers to out-stations, and a vacuum to bring them back again. When a vacuum is employed, the carriers are driven by the ordinary atmospheric pressure only of fifteen pounds to the square inch, but when condensed air is employed, almost any pressure may be applied, so that the carriers can be driven with enormous velocity. He also substituted felt for gutta-percha carriers, since the latter were sometimes partially melted by the heat occasioned by friction, and coated the insides of the pipes with sticky matter. Further, he designed some pneumatic valves; the carriers, on arriving at the end of their journey, were made to strike against a brass button, the motion of the button set a valve to work, the valve opened the door of the chamber at the end of the pipe, the carrier then fell out, and dropped down on the table below. Thus the carriers were made to let themselves out when they arrived at the end of their journey, by which plan much hand labour on the part of assistants was saved. These improvements worked well, and are working well at the present time. Seven or eight City telegraph stations have been thus pneumatically connected for many years.

But a further improvement in the system has been made within the past year or two by Mr. C. W. Siemens. He lays down the pipes in circuits, and has pressure in the rear, and a vacuum in front of each carrier, so that as the motive forces all act in one direction, there may be several carriers flying through the tubes at the same time. If these carriers were not stopped anywhere, they would all find their way back to the central station. He has invented also a "shunt," whereby any intermediate station can stop its own carrier, and pick it out of the tube without interfering with the motion of other carriers which may be flying through other parts of the circuit. Suppose the carriers to be three minutes apart in point of time, and that five stations are on the circuit, each station knows at what time its own carrier is due, so is able to take it out without interfering with other carriers. If the carriers be not sent at regular intervals of time, the receiving station can be told when its carrier is started, by telegraph. The plan of picking out the carriers is simple, and the principle may be explained by the aid of the accompanying diagram. A B is the main tube, and the direction taken by the carriers is denoted by the arrows; K K and N N are metal plates, between which the two short tubes D D and E H slide in an air-tight manner. These two short tubes are attached to a lever joint. When the assistant does not wish to intercept a carrier, the tube D D is left in the place occupied by the tube E H in the cut, and D D being open at both ends, carriers pass through it without interception. Upon sliding E H into the gap in the main tube, however, the carrier is stopped by it. It is brought to a standstill very gently, because it compresses some air in front of itself, which air issues with restricted freedom through the hole H; thus the carrier makes for itself an air-cushion to break the violence of the blow. When the carrier is caught, the tube D D is brought into the line of the main tube, after which an air-tight door in the side of E H is opened, and the captured carrier, with its messages, is taken out.



For short distances to and from telegraph stations near the Bank and the Post Office, the pneumatic tubes are from one-and-a-half to two-and-a-half inches in diameter; they vary in diameter according to distance. But the one large Siemen's circuit at present laid in London goes from Telegraph Street to Charing Cross and back, the General Post Office and the Temple Bar Office being the intermediate stations; this pipe is three inches in internal diameter. The carriers travel at the rate of about a mile in three minutes, but the rate varies with the pressure.

It may be asked why these pneumatic tubes are useful in connection with telegraphic offices? The fact is, that there are many disadvantages in sending messages very short distances by the electric telegraph. Suppose one telegraphic wire be suspended between two stations half a mile apart, and another be suspended between two stations three hundred miles apart; let thirty messages be received all at once for transmission over each of these two wires, it is plain that some of these messages will have to wait half an hour before their turn comes to be signalled over the wire. The public will not complain of a delay of half an hour in the delivery of a message in a town three hundred miles off, but they would make a great outcry if a message took half an hour to go half a mile by the electric telegraph. Therefore, it is the simplest and most expeditious plan for the central telegraph station in a great city to blow the messages bodily through tubes, to branch stations not far off; the plan saves time and saves labour. Complaints published in the newspapers about delays in telegraphic messages, refer for the most part to telegrams sent from one part of London to another, and the delays are often caused by the pressure of a sudden influx of work upon particular wires. WILLIAM H. HARRISON

NOTES

WE learn that the volume containing the various observations of the recent total eclipse will be edited by the Astronomer Royal.

IT is stated that Mr. Abel, Prof. Ramsay, and Mr. Huggins, have been invited to lecture this year to the members of the British Association at the forthcoming meeting at Edinburgh.

THE meeting of the Royal Colonial Institute on Monday is likely to have a practical result. The paper read was by Mr. Hyde Clark on the "Appointment of a Reporter on Trade Products for the Colonial Office." After an interesting discussion the President, Lord Bury, M.P., on the part of the Council, proposed that a Committee should be named to apply to the Secretary of State for the Colonies for such a department, and for the provision of a Colonial Museum on the same basis as the department provided at the India Office for India.

AT the last anniversary meeting of the Chemical Society it numbered 551 ordinary members and 36 foreign members. Six of the former have withdrawn from the Society,—on the other hand forty-two new members have been elected into the Society. It has lost five ordinary members by death, viz., Mr. George Jolley, Dr. W. A. Miller, Dr. Aug. Matthiessen, Dr. J. S. Muspratt, and Mr. W. W. Rouch; and the deaths must also be recorded of two foreign members, viz., Prof. Gustav Magnus and Prof. Weltzien. The election of the president, the officers, and the other members of Council for the ensuing year was then proceeded with, and the following is the list of the gentlemen elected:—President: Frankland, E., D.C.L., F.R.S. Vice-Presidents, who have filled the office of President: Brodie, Sir B. C., F.R.S.; De la Rue, Warren, Ph.D., F.R.S.; Hofmann, A. W., D.C.L., F.R.S.; Playfair, Lyon, Ph.D., C.B., F.R.S.; Williamson, A. W., Ph.D., F.R.S.; Yorke, Col. P., F.R.S. Vice-Presidents: Debus, H., Ph.D., F.R.S.; ilbert, J. H., Ph.D., F.R.S.; Noad, H. M., Ph.D., F.R.S.; Odling, W., M.B., F.R.S.; Redwood, T., Ph.D.; Stenhouse, J., Ph.D., F.R.S. Secretaries: Harcourt, A. Vernon, M.A., F.R.S.; Perkin, W. H., F.R.S. Foreign Secretary: Müller, H., Ph.D., F.R.S. Treasurer: Abel, F.A., F.R.S. Atkinson, E., Ph.D.; Bassett, H.; Bloxam, C. L.; Dupré, A., Ph.D.; Field, F., F.R.S.; Holzmann, M., Ph.D.; M'Leod, H.; Mills, E. J., D.Sc.; Roscoe, H. E., Ph.D., F.R.S.; Russell, W. J., Ph.D.; Smith, R. Angus, Ph.D., F.R.S.; Voelcker A., Ph.D., F.R.S.

DR. GEORGE BURROWS, F.R.S., Physician Extraordinary to the Queen, has been elected President of the Royal College of Physicians, in succession to Sir James Alderson.

A THIRD (revised) edition is now in the press of Mr. Darwin's "Descent of Man."

MR. JAMES CROLL calls our attention (*à propos* of our notice of his paper "On the Cause of the Motion of Glaciers," No. 68, p. 309) to the fact that he does not conclude the age of the sedimentary rocks to be 1,036,800,000 years, but *assumes* the period—for reasons stated on a former occasion—to be only 100,000,000 years. The drift of the paper was to point out a "new method" of determining the (mean) thicknes of the sedimentary rocks. The method leads to the conclusion that their thickness cannot be much over 2,500 feet!

DR. HOOKER has just started on a botanical expedition of eight or ten weeks into the interior of Morocco, a hitherto almost untried field. He is accompanied by Mr. R. Ball and one of the gardeners from Kew to assist in collecting plants.

WE learn from the *Journal of Botany* that Dr. Karl Heinrich Schultz-Schultzenstein, of Berlin, one of the most eminent botanists in Germany, was found dead in his bed on the morning of March 23rd. He had been engaged at his desk till past midnight. The deceased, though in his seventy-third year, was remarkably active, and was lecturer on physiology, as well as on botany, in the University of Berlin, with which he had been connected since 1822.

THE Medical Scholarship for Women in Edinburgh University of the value of 50*l.* for three years, offered for competition by Mrs. Garrett Anderson, M.D., and two other ladies, has been gained by Miss Annie Barker, daughter of Dr. Barker of Alderhot. It was awarded according to the results of the preliminary examination in Arts in the University.

WE learn from Paris that M. W. De Fonvielle was sentenced to death by the insurgents in consequence of an article published in the *Times* of March 27. We have however had the satisfaction of receiving from him this week our usual budget of Paris news. The only men of science who have ranked with the insurgents are M. Le Français, a former teacher in an elementary public school, M. Jules Allix, inventor of a new system of orthography, M. Charles Emmanuel, who opposes the theory of the rotation of the earth from west to east; Dr. Robault, a homœopathic practitioner, and M. Leroy, a foreman employed by Messrs. Hachette and Co. for reading for the press. A false rumour was circulated in the Quartier Latin that they were to send a delegate to take possession of the Observatory, the Ecole de Médecine, the Ecole de Droit, College de France, Institute, and Jardin des Plantes. All these establishments have, however, been left undisturbed in the hands of the scientific authorities.

LAST week the *Journal Officiel* of the insurgents printed the account of the sitting of the Institute. But "reactionary" papers having sharply commented on the piracy, the *Officiel* abstained from mentioning the sittings of that assembly. The students have to a man ranked amongst the defenders of order. Almost every educational establishment is closed during "the revenge of science" proclaimed by the Commune. Pupils of the Polytechnic School were sent home, lectures at the Sorbonne, College de France, and Conservatoire des Arts have been stopped. Libraries are closed, and no books are being published or selling in Paris. There is no question of reform as long as the rebels enjoy their rule, and the Garde Nationale their thirty sous a day.

THE Hunterian Professor of Comparative Anatomy at the Royal College of Surgeons concluded his course on the Characters and Modifications of the Teeth of Mammalia on Wednesday, the 29th ult. In the last lecture the methods of drawing inferences as to the affinities and habits of extinct animals from dental characters were illustrated by the much controverted case of *Thylacoleo carnifex* of Owen, an extinct Australian marsupial, known at present only by its skull and teeth. The animal is supposed by its original describer to have been one of the fellest and most destructive of predatory beasts, and to exemplify the simplest and most effective dental machinery for predatory life and carnivorous diet known in the Mammalian class, a proposition which Prof. Flower contested, showing by comparison with all the recent marsupials, that its affinities are with the existing diprotodont species (kangaroos, potaroos, and phalangers), none of which are purely predaceous and carnivorous, and that, therefore, there can be no reason for inferring that *Thylacoleo* had such habits, unless any special modifications of its teeth towards the carnivorous type could be indicated. This was, however, shown not to be the case, by comparison with all the various known truly predaceous carnivores, whether belonging to the placental or to the marsupial type of mammals. There are, therefore, no grounds for the assumption on which the name of the animal is based. But, on the other hand, neither can it, according to Prof. Flower, be classed among herbivores in the ordinary sense of the word; and all arguments against its "herbivority" derived from the structure of its molar teeth have no bearing on the proof that it was lion-like in its habits, as there are numerous alternative suppositions. Indeed, the teeth of this remarkable animal are so highly specialised and unlike those of any actually existing species, that it is impossible from analogy with recent forms to deduce its mode of life with any certainty, its organisation having in all probability been in conformity with some surrounding conditions which have now passed away.

AT a meeting of the American Ethnological Society of New York, held in October 1869, a committee was appointed for the purpose of organising a new body upon the basis of the society just mentioned, to be entitled the Anthropological Institute of New York. This committee lately issued invitations to the members of the Ethnological Society, and others interested, to attend at the house of Mr. E. G. Squier on the 19th of March, in order to complete the proposed arrangements by adopting a constitution and by-laws, to be formally presented to the meeting. In the present interest which attaches to studies relating to the past and present history of mankind and the development of civilisation, it is much to be hoped that this new society will establish itself on a firm foundation in New York, and carry out the mission projected for it by its founders.

FOR some years Dr. Burmeister, an eminent German naturalist and physicist, from Halle, has resided in Buenos Ayres, in charge of the National Museum in that city, and by his nvestigations and publications concerning specimens belonging to the Museum has given to it a great reputation. Quite recently, as we learn from *Harper's Weekly*, a murderous attack was made upon him by one of his servants, which was happily frustrated; but the newspaper comments upon the transaction developed the existence of so much animosity or jealousy toward foreigners on the part of the people that the doctor has finally determined to resign his position and return to Germany. Dr. Sarmiento, the President of the Republic, it is said, has endeavoured to change this determination, but apparently without effect. In parting with Dr. Burmeister, Buenos Ayres will lose one who has given to the country that position in science through his writings that Dr. Sarmiento has in literature, and his loss will not easily be made good. It is an interesting fact that both the National Museums of Chili and of the Argentine Republic are presided over by German naturalists, the director of the latter being Dr. R. L. Phillippi, well known in the scientific community.

In June next Professor Birkett will commence his course of lectures on the Nature and Treatment of New Growths, at the Royal College of Surgeons, on the conclusion of which Mr. Hulke will deliver three lectures on the Minute Anatomy of the Eye.

We learn from the *British Medical Journal* that Dr. E. Klein of Vienna has been appointed Assistant Professor in the new laboratory in connection with the Brown Trust for Experimental Pathology, which is about to be erected in London. Dr. Klein has been Professor Stricker's assistant for several years, and has contributed much to that author's "Handbook of Histology," now being published in English by the New Sydenham Society. By this change, Austria will lose and this country gain one of the most promising of young histologists. As an investigator and teacher of the structure of tissues, Dr. Klein has been for several years held in much esteem in Vienna.

The following are the arrangements for the Lectures at the Royal Institution of Great Britain after Easter, 1871:—On Tuesdays, April 18 and 25, and May 2, William Pengelly, F.R.S., will deliver three lectures "On the Geology of Devonshire, especially of the New Red Sandstone." On May 9 and 16, Charles Brooke, F.R.S., will lecture "On Force and Energy." On May 23 and 30, and June 6, the Rev. Professor Haughton, M.D., F.R.S., will lecture "On the Principle of Least Action in Nature, Illustrated by Animal Mechanics." On Thursdays, April 20 to June 8, Professor Tyndall, LL.D., F.R.S., wil deliver eight lectures "On Sound;" and on Saturdays, April 22 to June 10, J. N. Lockyer, F.R.S., will deliver eight lectures "On Astronomy." The lecture hour is three o'clock. The following are the probable arrangements for the Friday evenings after Easter, 1871, to which members and their friends only are admitted:—April 21, Professor Blackie, F.R.S.E., "On the Pre-Socratic Philosophy." April 28, Professor Odling, F.R.S. May 5, W. R. S. Ralston, M.A., Trinity College, Cambridge, "On Russian Folk-Lore." May 12, Professor Huxley, F.R.S. May 19, Colonel Jervois, R.E., C.B., Secretary of the Defence Committee, and Deputy Director of Fortifications, "On the Defence of the United Kingdom." May 26, Sir J. Lubbock, Bart, M.P., F.R.S., "On Relationships." June 2, Professor Thomas Andrews, F.R.S., Principal of Queen's College, Belfast, "On the Gaseous and Liquid States of Matter." June 9, Professor Tyndall, LL.D., F.R.S.

Prof. Winchell, director of the Geological Survey of Michigan, has lately presented a report of the progress of the survey from its inauguration, May 1869, to November 1870. He sketches an outline of the nature and extent of the researches he proposes in connection with the investigations, and expresses a desire for sufficient appropriations to enable him to complete his work in the shortest possible time, two years being suggested as sufficient with proper means. His plan includes, in addition to pure geology and mineralogy, such subjects as palæontology, climatology, natural history, ethnology, &c. The sum of 61,300 dols. is asked for by the Professor for the purpose of completing his field work, as well as of preparing the necessary maps and illustrations for his report.

We have information of the departure of M. Miclucho Maclay, of Russia, in the Russian steamer *Witiaz*, for a seven or eight years' cruise in the Pacific—the first two of which are to be expended in the investigation of the island of New Guinea. This region, as is well known, abounds in objects of natural history of the greatest interest, although comparatively little, so far, is known of its features in detail.

The Royal Belgian Academy of Science, Letters, and the Fine Arts has just issued its thirty-seventh *Annuaire*, containing a historical sketch of the Academy, and biographical sketches of the following members who died during the year:—François Joseph Navez, painter, with a list of his works and pupils; Edward Ducpetiaux, political economist and prison reformer; Charles-Fréd.-Phil. von Martius, the celebrated botanist; Edouard Gerhard, philologist and archæologist; Prudens Van Duyse, poet; and Charles Aug. de Bériot, composer.

The new explosive dualin has been used in the blastings required for the great Hoosac tunnel in the United States. Over 1,000lb. have been exploded since December 1, and it appears to possess the full strength of nitro-glycerin, besides being perfectly safe from any ordinary blaster to handle. It will not explode by concussion, and can be tamped as hard as powder with perfect safety. There seems no reason why it will not eventually entirely supersede common powder for all blasting purposes.

The *Scientific American* announces a substitute for lime in the lime-light of the oxyhydrogen jet. It appears that a prism cut out of the mineral dolomite will emit a light as powerful if not superior to the calcium light. The dolomite is made up of nearly equal parts of the carbonate of lime and magnesia, and the combination of these two earths produces effects superior to what can be obtained from either of them alone. The light is said to be suited for photographic purposes, especially for copying pictures. As dolomite is an abundant rock, its application for purposes of light may prove of peculiar value.

The report of the Manchester Field Naturalists' Society for 1870 has, according to the Secretary, "little to say except that the year's proceedings have been marked by smoothness and success, with no particular incidents to give it distinction above preceding years, and certainly without any of an infelicitous kind." The meetings have been well attended; there has been a considerable entry of new members; and the Treasurer's report is satisfactory. The report is taken up with brief *résumés* of the proceedings at each meeting, and a summary is given of a useful paper by Mr. R. B. Smart "On the Variation of Species" in the vegetable kingdom. We much regret that, from a society numbering its members by hundreds, we cannot obtain a proportionate amount of work; indeed many of the smaller bodies put the Field clubs of our large towns to shame in this respect. Mr. Grindon's "Flora of Manchester" is not only out of date, but also out of print; and a complete fauna and flora of the district would be both useful to naturalists and creditable to the society. Surely among so many members some may be found both able and willing to undertake such a work. We observe that the Secretary, in the present report, speaks of plants by their English names, some of which are of his own invention. As their scientific equivalents are omitted we are left in the dark as to some of them; "dimplewort" is, we believe, *Cotyledon umbilicus*, but "blushwort" baffles our ingenuity. The President for 1871 is Mr. Thomas Turner, F.L.S., and Mr. Grindon continues to act as Secretary, THE time for the trial of machines for separating the fibres of the Rhea plant which are to be sent in by competition for the Indian Government prize of 5,000*l.*, has been postponed till April 1872. It is requested that notice of intention to compete be given before May of this year. Arrangements have been made for supplying some of the plant to intending competitors.

THE FIRST GERMAN NORTH POLE EXPEDITION

A NUMBER of Petermann's "Mittheilungen" published in January 1871, consists of an account of the first German North Pole Expedition by Captain Koldewy and Dr. A. Petermann. The vessel in which this expedition was undertaken was the *Germania*, a cutter of only eighty tons burden. Twelve persons sailed in her, Captain Koldewey, the commander of the party and joint author of the present memoir, R. Hildebrant, chief mate, and ten sailors. They started from Bergen May 24, 1868, the Swedish expedition sailing about the same time in a steamer. The voyage extended over four months. Dr. Petermann considers that the only practicable routes to the North Pole are either through Behring's Straits or the sea between Greenland and Spitzbergen. The latter was attempted by the Expedition.

The year turned out to be a most unfavourable one, the sea being more than usually obstructed with ice. After vainly attempting to reach the east coast of Greenland, the *Germania* crossed over to Spitzbergen, but was stopped by pack-ice. Greenland was again visited with a like result; but on a second trial of the Spitzbergen route a fortunate break in the ice occurred, and on September 14, lat. 81°·5 was reached, this being the highest point ever yet attained by a ship, although with sledges 82°·45 was reached by Parry in 1827. The east coast of Spitzbergen was visited by means of the straits (Hinlopen Strasse) which separate the smaller northern portion of this group of islands from the larger southern portion. Here a new island was discovered, and the surrounding coast-line mapped. Dr. Petermann names the island William Island, and the straits which separate it from the mainland Bismark Straits; we also find on the map Augusta Bay and Cape Moltke. Dr. Petermann rejoices greatly that the Germans have thus at last left their mark on the map. He says that it has been very trying to him to have seen for the last thirty-two years in maps of all parts of the world containing new geographical discoveries no names but "Victoria," "Wellington," "Smith," "Jones," &c. Captain Koldewey describes the glaciers of Spitzbergen as differing from those of Switzerland in the following points:—They for the most part stretch right down into the sea, where they end in a perpendicular wall. The upper surface is somewhat polished and free from all roughness and steep ice blocks. Moreover in the glaciers examined at Augusta Bay and William Island there are no crevasses. Moraines are present, those of the great glacier in Augusta Bay consisting of limestone and basalt. The actual scientific results of the expedition are very small, owing to the badness of the weather. Some fragmentary monthly isothermals of sea temperature have been constructed by Dr. Petermann from the observations made during the voyage, and are marked on the two maps which accompany the memoir. Captain Koldewey considers that the route by the East coast of Greenland is the one which should be attempted by future expeditions. The route north of Spitzbergen is impracticable, because a branch of the Gulf Stream here meets directly the cold polar current, and a barrier of ice is the result. For further exploration he advises the employment of a schooner rigged vessel of from 150 to 200 tons, with auxiliary steam power.

REPORT ON DEEP-SEA RESEARCHES

Carried on during the months of July, August, and September, 1870, in H.M. Surveying Ship "Porcupine."

BY W. B. CARPENTER, M.D., F.R.S., AND J. GWYN JEFFREYS, F.R.S.

(*Concluded from p.* 417.)

WE commenced our observations on the morning of Oct. 1 at the point of greatest depth (Station 65). The temperature of the surface at 6 A.M. was only 63°, which was at least eight degrees lower than the average temperature at that hour within the Mediterranean. The bottom temperature at 198 fathoms was 54°·5; and the specific gravity of the bottom water was 1028·2. The coincidence both in temperature and specific gravity with the bottom-water at Station 64 was thus very close. The place of the ship having been determined by angles taken with the shore, the rate of the surface-movement was tested as on former occasions; and was found to be 1·277 mile per hour, its direction being E. ½ S. The "current drag" was then sunk to 150 fathoms,—the greatest depth at which it was thought safe to use it; and the boat from which it was suspended moved E. ¾ N. at the rate of 0·840 mile per hour. This observation indicated a very considerable retardation in the rate of *in*-flow; but gave no evidence of an *out*-flow. It did not, however, negative the inference deducible from the temperature, and still more from the specific gravity of the water beneath, that an out-flow takes place in that lowest stratum which we could not test by the "current drag."

We then steamed across the deep channel towards the Spanish side; and passing a bank of 45 fathoms which rises near its middle, we sounded again at Station 66, about six miles to the northward of Station 65. The surface-temperature at 9 A.M. was here found to have risen to 69°; and since not more than half this increase could be attributed, according to our experience elsewhere, to the increase of direct solar radiation at this period of the day, the cause of the additional elevation has to be sought elsewhere. The length of sounding-line run out was 147 fathoms; but on attempting to reel it in, the lead was found to have fixed itself between rocks; and all Capt. Calver's skill in the management of his ship proved inadequate to free it. As we were thus anchored by our sounding-line, it was requisite to set ourselves free, by putting a breaking strain upon it; and we thus lost, with the lead, one of our water-bottles, and a pair of thermometers, one of which was specially valued by us as having been used throughout the *Porcupine* Expedition of 1869, in which the temperature soundings had proved of peculiar importance. The "current-drag" was here let down to 100 fathoms; and the boat from which it was suspended moved along in the direction of the surface-current, and at the rate of 1·280 mile per hour, which was almost precisely that of the surface-current in the previous observation.

Deeming it important to obtain the temperature and specific gravity of the bottom-water on the Spanish side of the deeper portion of the channel, we slightly shifted our ground, and again let down our lead, with thermometers and water-bottle, at Station 67, where the depth proved to be 188 fathoms. On beginning to reel in the line, we found the lead to have anchored as before, and for some time feared that we should sustain a second loss of the water-bottle and thermometers attached to it. The means taken by Captain Calver for its extrication, however, proved on this occasion successful; and we had the satisfaction of seeing the whole apparatus safely brought up,—the lead bearing evident marks of having been jammed between rocks and then violently strained. The temperature of the bottom proved to be 55°·3, that of the surface being 73°; and the specific gravity of the bottom-water was 1028·1, that of the surface being 1026·8. Here again, therefore, the evidence afforded by the temperature and specific gravity of the bottom-water was conclusive as to its Mediterranean character. Its density corresponded rather with that of the bottom-water, than with that of the intermediate stratum, at the opposite end of the Strait; but the more rapid westerly motion of the latter would seem to indicate that the water which here flows over the "ridge" is derived from it, rather than from the deeper layer, and that its diminution in density is due to the dilution it sustains in its course. In either case, the denser Mediterranean water discharged by this undercurrent must flow up-hill; but the incline is so gradual that a very small force, if constantly sustained, would suffice to produce the elevation needed to carry it over the ridge.